

**METHOD FOR DISPLAYING A VIRTUAL
INTERACTION ON AT LEAST ONE SCREEN
AND INPUT DEVICE, SYSTEM AND
METHOD FOR A VIRTUAL APPLICATION
BY MEANS OF A COMPUTING UNIT**

[0001] The present invention relates to a method for displaying a virtual interaction on at least one screen and with an input device, a system and method for a virtual application by means of a computer unit. Particularly preferably, the invention is used to interact with what is known as a Head Mounted Display (HMD), by means of which the field of view of the wearer of the HMD, the user, augments the reality in front of his eyes through virtual visual representations (AR: Augmented Reality). In the following, the virtual visual representations will only be designated as virtual representations, because the invention relates to the visual representation by means of at least one screen, for example, in the form of a Graphical User Interface (GUI).

[0002] Various input representations or interactive representations are known from the prior art, which comprise advantages and disadvantages respectively. For example, making inputs via a touch-sensitive screen (Touchscreen) is known, by which through more or less intuitive gestures a relatively simple operation of what is shown on the screen is permitted. Such an input has the advantage that no cursor is needed, therefore no graphical representation of the pointer, such as, for example, a mouse pointer, because the user's finger itself undertakes the interaction translated by the touchscreen in the field of view of the user. However, such an application requires firstly familiarisation with the sometimes complex gestures on the one hand, and is not transferable or only transferable in a limited way to applications without a screen in the natural radius of movement. Furthermore, the areas of the screen that the user touches are covered by the finger of the hand and possibly by the palm of the hand. This makes it more difficult to operate and sometimes requires learning the position of buttons of a GUI, for example, when operating a keyboard with a swiping technique, such as using Swype from Swype Inc.

[0003] Creating three-dimensional recordings of body parts or fixed infrared (IR) markers on body parts with cameras, sometimes infrared (IR) cameras, particularly at least by one hand, that allows a realtime control of a GUI is also known. Together with a motion model, the images are converted into a virtual representation of the recorded body parts. This technique has two major disadvantages. Firstly, the cameras are arranged at a fixed location and the user has to move in this field of view. Secondly, the recorded body parts are currently represented by unsuitable representations, for example of the body parts themselves or a usual cursor symbol. Such representations make it difficult for the user to act with this representations in the virtual environment and particularly require a learning process.

[0004] A helpfully improved 3D interaction option is a locally-independent product that is fitted to the wrist. In one variant the movement of the finger is determined by means of (a) camera(s). In a further variant, the bending of the finger is determined indirectly by means of ultrasound measurement of the flexor tendons of the hand that run bundled through the carpal tunnel. In both variants, a movement model of the hand is stored. Unfortunately, these devices are bulky and cumbersome for the other (real)

activities with the hand and/or deficient because of a limited motion capture, for example due to occlusions (covering the field of view).

[0005] Only recently has a marketable product been introduced that can be implemented in the form of a finger ring on the index finger and records a relative change of position of the hand or index finger by means of motion sensors. This finger ring that is marked by Nod Inc. under the name Nod also exhibits a side touchpad, to achieve an input. However, this finger ring differs from the already long known Wii™ remote control from the company Nintendo® simply by the form of being wearable on the finger. The input representation associated herewith is traditional and comprises the disadvantages illustrated above of the need to learn the gestures and the limitation of operation that entails. Also, the finger ring only reproduces the absolute movement of the ringed finger, therefore reproducing the movement of the entire hand with a single finger ring and generally the ringed phalanx proximalis.

[0006] The disadvantages illustrated here of the known prior art are at least partially solved by the invention described in the following. The features according to the inventions are stated in the independent claims, for which advantageous embodiments are stated in the dependent claims. The features of the claims can be combined in any technically reasonable way, wherein also the explanations from the following descriptions and the features from the figures, which comprise supplementary embodiments of the invention, can be used.

[0007] The invention relates to a method of representing a virtual interaction on at least one screen by means of a computer unit, comprising at least the following steps:

[0008] Representation of a virtual surface on at least one screen;

[0009] Representation of a position of a pointer by means of a defined deformation of the virtual surface if the pointer is located on the virtual interface;

[0010] Displacement of the defined deformation upon a corresponding displacement of the pointer while the previously defined deformation is cancelled, wherein the at least one pointer is generated by means of an input device for a virtual application by means of a computer unit, wherein the input device exhibits at least the following components:

[0011] A fastening device for fastening to a hand;

[0012] A recording device for creating recording data of the relative position of at least one finger of a hand with respect to the input device and/or with respect to at least one further component of the hand and/or with respect to a real surface, if the activated input device is fastened to the hand by means of the fastening device;

[0013] An internal computer unit for processing the recording data;

[0014] A transmitter unit for sending the processed recording data of the computer unit, wherein by means of the said recording data at least one corresponding virtual interaction can be generated by means of the internal and/or an external computer unit.

[0015] According to a further aspect of the invention a method of representing a virtual interaction on at least one screen by means of a computer unit, comprising at least the following steps is proposed:

[0016] Representation of a virtual surface on at least one screen, wherein the virtual surface comprises a coordinate